Fresh Concrete

Fresh concrete is that stage of concrete in which concrete can be moulded and it is in plastic state

Properties of Fresh concrete

- Workability
- Consistency
- Segregation
- Bleeding

Workability

- Workability is often referred to as the ease with which a concrete can be transported, placed and consolidated without excessive bleeding or segregation
- **Slump Test** can be used to find out the workability of concrete

Factors Affecting Workability

- Workable concrete is the one which exhibits very little internal friction between particle
- The factors helping concrete to have more lubricating effect to reduce internal friction for helping easy compaction are given below:

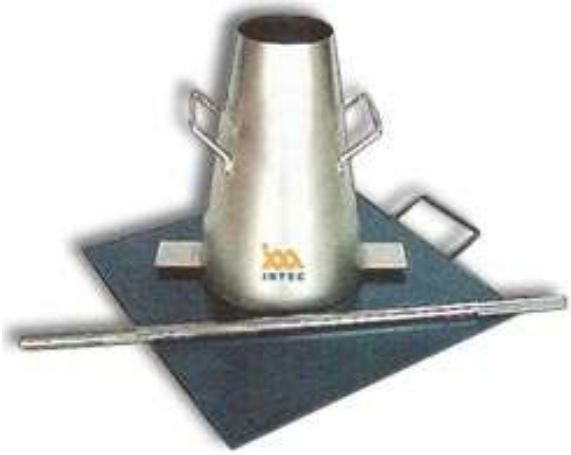
- Water Content
- Mix Proportions
- Size of Aggregates
- Shape of Aggregates
- Surface Texture of Aggregate
- Grading of Aggregate
- Use of Admixtures

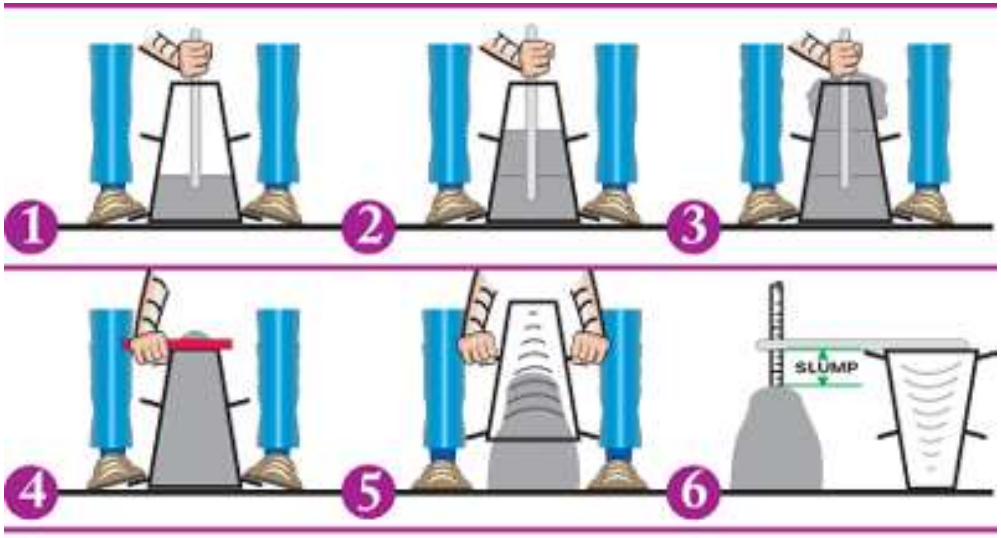
Consistency

- Ease of flow of concrete
- Consistency is the aspect of workability related to the flow characteristics of fresh concrete
- It is an indication of the fluidity or wetness of a mix and is measured by the slump test

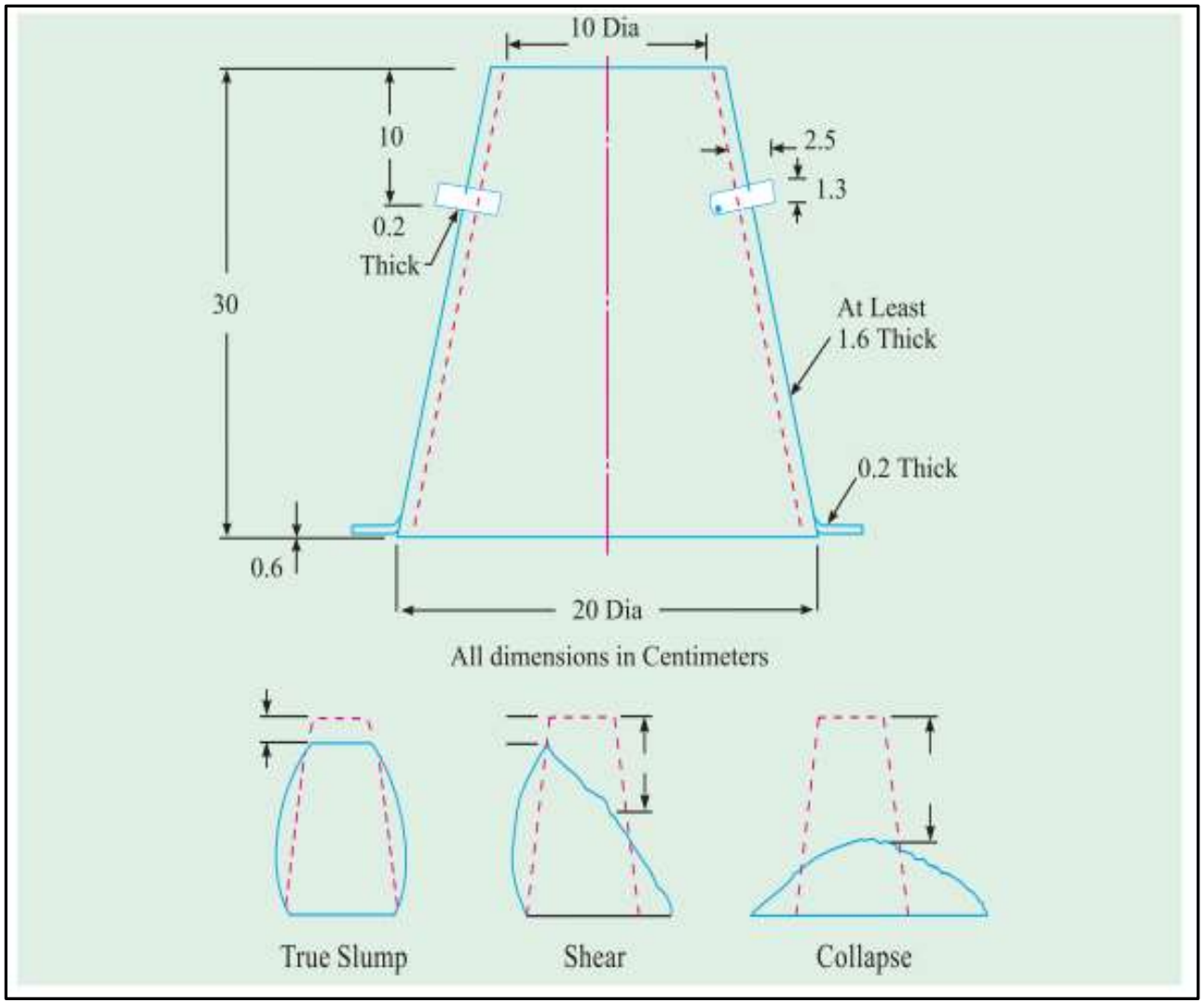
Slump Test

- Slump test is the most commonly used method of measuring consistency of concrete It is not a suitable method for very wet or very dry concrete.
- However, it is used conveniently as a control test and gives an indication of the uniformity of concrete from batch to batch.





Slump test

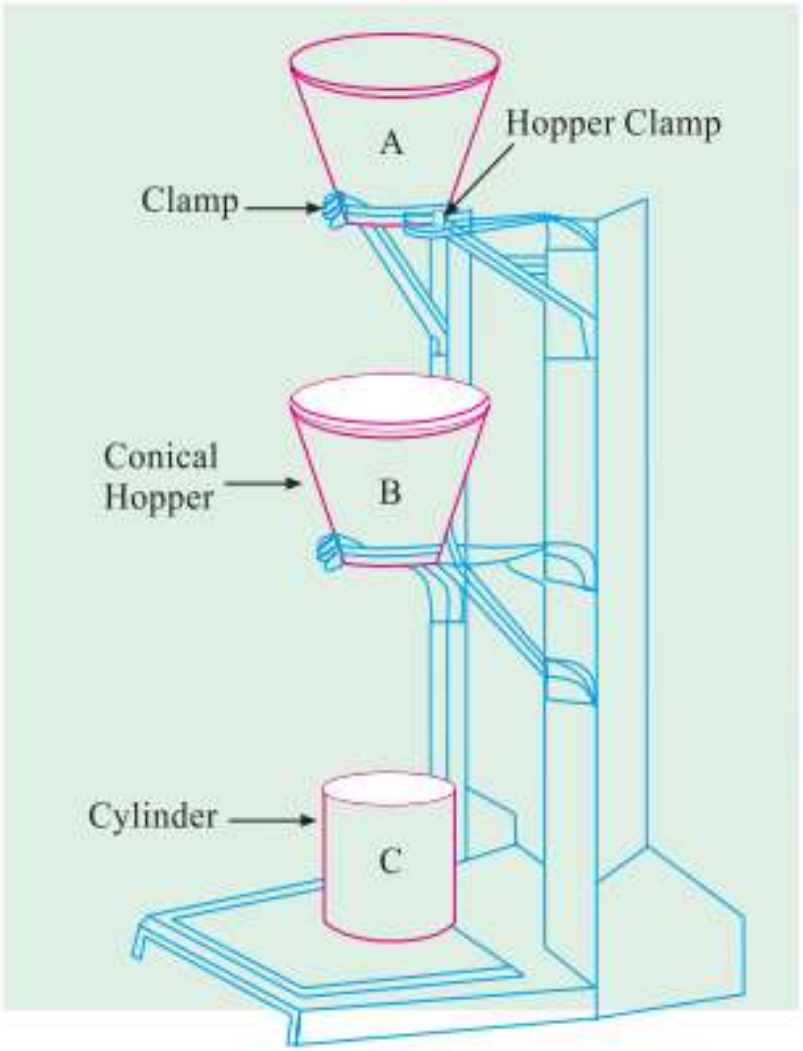

10 Dia
10
2.5
1.3
0.2
Thick
30
At Least
1.6 Thick
0.2 Thick
0.6
20 Dia
All dimensions in Centimeters
True Slump
Shear
Collapse

Compacting Factor Test

- It is more precise and sensitive than the slump test
- It is particularly useful for concrete mixes of very low workability as are normally used when concrete is to be compacted by vibration
- Such dry concrete are insensitive to slump test
- The degree of compaction, called the compacting factor is measured by the density ratio i.e., the ratio of the density actually achieved in the test to density of same concrete fully compacted

$$\text{The Compacting Factor} = \frac{\text{Weight of partially compacted concrete}}{\text{Weight of fully compacted concrete}}$$

Compacting Factor Test



Compacting Factor Apparatus

Compacting Factor Test

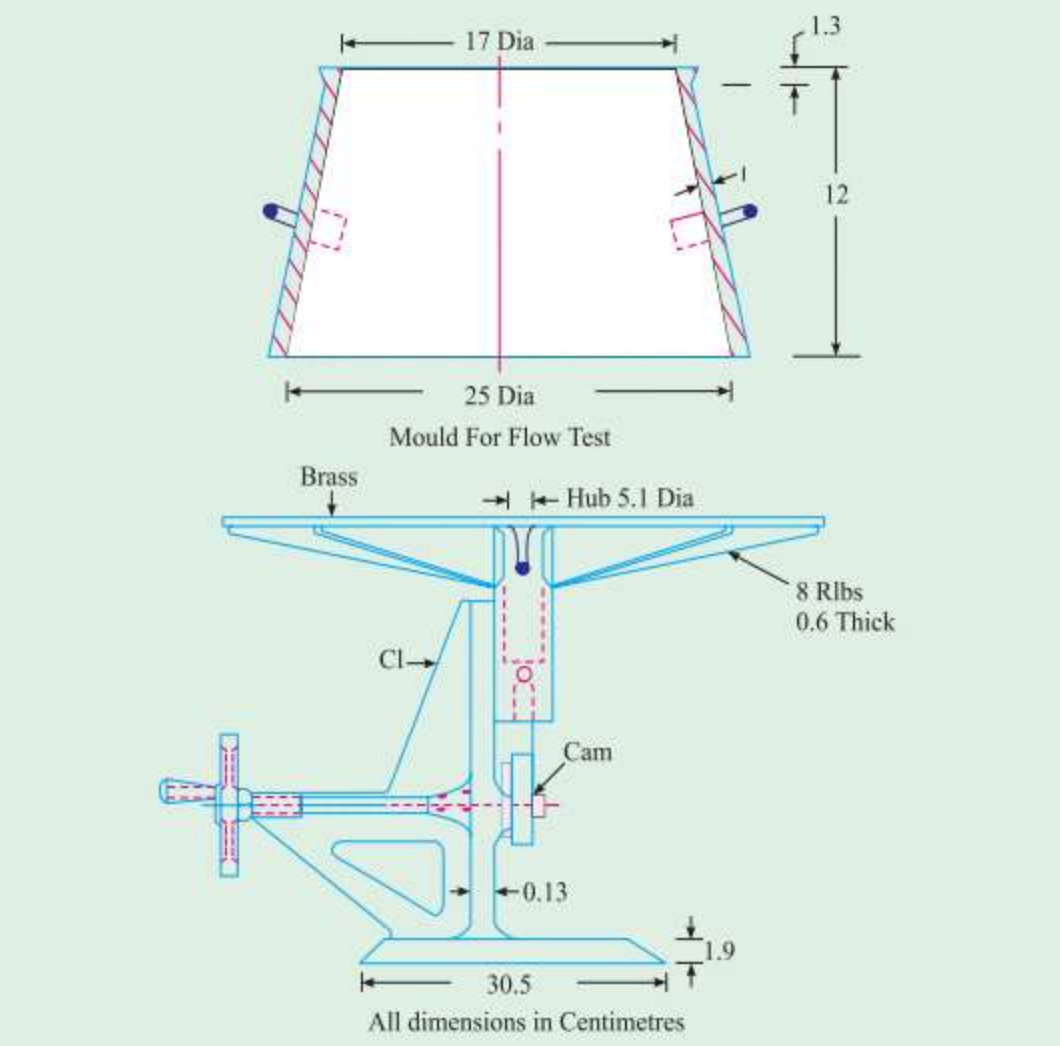
Essential Dimension of the Compacting Factor Apparatus for use with Aggregate not exceeding 40 mm Nominal Max. Size

Upper Hopper, A	Dimension cm
Top internal diameter	25.4
Bottom internal diameter	12.7
Internal height	27.9
Lower hopper, B	
Top internal diameter	22.9
Bottom internal diameter	12.7
Internal height	22.9
Cylinder, C	
Internal diameter	15.2
Internal height	30.5
Distance between bottom of upper hopper and top of lower hopper	20.3
Distance between bottom of lower hopper and top of cylinder	20.3

Flow Test

- This test gives an indication of the quality of concrete with respect to consistency, cohesiveness and the proneness to segregation
- In this test, a standard mass of concrete is subjected to jolting
- The spread or the flow of the concrete is measured and this flow is related to workability.
- The apparatus consists of flow table, about 76 cm. in diameter over which concentric circles are marked.
- A mould made from smooth metal casting in the form of a frustum of a cone is used with the following internal dimension
- The base is 25 cm. in diameter, upper surface 17 cm. in diameter, and height of the cone is 12 cm

Flow Table Apparatus



Flow Table Apparatus

- Each layer is rodded 25 times with a tamping rod 1.6 cm in diameter and 61 cm long rounded at the lower tamping end.
- After the top layer is rodded evenly, the excess of concrete which has overflowed the mould is removed.
- The mould is lifted vertically upward and the concrete stands on its own without support.
- The table is then raised and dropped 12.5 mm 15 times in about 15 seconds.
- The diameter of the spread concrete is measured in about 6 directions to the nearest 5 mm and the average spread is noted.
- The flow of concrete is the percentage increase in the average diameter of the spread concrete over the base diameter of the mould

$$\text{Flow, per cent} = \frac{\text{Spread diameter in cm} - 25}{25} \times 100$$

Segregation

- Segregation can be defined as the separation of the constituent materials of concrete
- A good concrete is one in which all the ingredients are properly distributed to make a homogeneous mixture
- Segregation may be of three types
    - Firstly, the coarse aggregate separating out or settling down from the rest of the matrix
    - Secondly, the paste or matrix separating away from coarse aggregate and
    - Thirdly, water separating out from the rest of the material being a material of lowest specific gravity
- A well made concrete, taking into consideration various parameters such as grading, size, shape and surface texture of aggregate with optimum quantity of waters makes a cohesive mix. Such concrete will not exhibit any tendency for segregation.

Bleeding

- Bleeding is sometimes referred as water gain
- It is a particular form of segregation, in which some of the water from the concrete comes out to the surface of the concrete, being of the lowest specific gravity among all the ingredients of concrete
- Bleeding is predominantly observed in a highly wet mix, badly proportioned and insufficiently mixed concrete
- In thin members like roof slab or road slabs and when concrete is placed in sunny weather show excessive bleeding.
- Due to bleeding, water comes up and accumulates at the surface
- Sometimes, along with this water, certain quantity of cement also comes to the surface.
- When the surface is worked up with the trowel and floats, the aggregate goes down and the cement and water come up to the top surface.
- This formation of cement paste at the surface is known as “Laitance”